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Research Paper

Sanitation Systems In Use In Mlolongo Sub County Machakos County, 2017

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ABSTRACT

Sanitation and community health is an integral part of the National Development Strategy. Everybody is entitled to adequate, safe, accessible, non-discriminatory sanitation which meets the laid down standards that protect public health and environment. The responsibility of meeting these right falls upon National and County governments who provide legislation, policies, strategies, rules and regulations on sanitation. Standards are measures used to ensure everybody has equal access to safe and adequate sanitation. Disposal of waste without adhering to sanitation standards for waste management leads to environmental degradation and pollution of ground and surface water sources, spreading water borne diseases. Meeting UN Millennium Development Goals of halving the percentage of people without access to improved sanitation by 2015 has not been achieved because even where sanitation systems exist, they are not operational due to lack of institutional capacity, inadequate water supply service level, overpopulation, and unsuitable hydro-geological conditions. The objective of the study was to assess the sanitation systems in use in Mlolongo Sub County Machakos County. The research sampled a population of 200 respondents from baseline survey using cluster sampling. The tools

used for data collection included key informant interviewing, questionnaires, participant observation and desk top research. The results showed the separation distances of facilities (pit latrine and septic tanks) and building are lower than 3m and 1.5m respectively. The facilities used in the Mlolongo area are conservancy tanks, septic tanks without soak aways, ventilated improved pit latrines, simple pit latrines. There is no sewer line in Mlolongo. The existing sanitation facilities face problems including; inadequate maintenance, hydrogeological conditions, unattainable technological options, lack of a wastewater treatment site, and lack of sanitation promotion programmes.

Key words: Sanitation, wastewater, public health, Mlolongo, Machakos.

1.0 Background of the Study

There are high incidences related to lack of water, poor sanitation and poor hygiene globally, with the developing countries bearing the greatest load. Sanitation related diseases weaken and kill one million Africans every year (Prüss *et al*, 2002). The number of people without improved sanitation facilities globally stands at 2.6 billion (WHO/UNICEF, 2010).

The health of the community is greatly affected by the availability, accessibility and quality of sanitation facilities. Studies indicate that an estimated 400 million children have diminished due to intestinal worm infestation (Khanal *et al*, 2011); while according to the International Resource Centre on Water and Sanitation (IRC, 2005) 75 percent of people are in marginalized areas. Sanitation is an important aspect that is poorly addressed in developing nations and a major cause of high infant mortality and morbidity as well as in children and the general population. The United Nations (UN) has included it as an integral part of the Millennium Development Goals (MDG's) as: MDG 7, Target 7C: 'To halve, by 2030, the proportion of people without sustainable access to safe drinking water and basic sanitation'; (UN, Millennium Development Goals Project, 2000).

Recent estimates indicate that 2.6 billion people (approximately 39% of the global population), lack access to improved facilities for the disposal of human excreta, such as a basic pit latrine, toilet connected to a septic tank or sewer system or a composting toilet (WHO/UNICEF, 2010). In several parts of the developing world sanitation lags behind in all infrastructure development. In sub–Saharan Africa 66% of the population had no access to basic sanitation services in 2008 (WHO/UNICEF, 2010). Sanitation is a human right to all Kenyans. Every person has the right to reasonable standards of sanitation in adequate quantities and quality (GoK, 2010a). Vision 2030 also identifies the need for improved sanitation in the country. The 2030 vision for sanitation is to ensure that improved sanitation is available and accessible to all. It aims to increase access to both safe water and sanitation in both rural and urban areas (GoK, 2007a). Sanitation coverage in Kenya declined in the decade up to 1990 and saw modest gains thereafter. National sanitation coverage in 1983 was 49% (GoK, 1983) 45% in 1990, 46% in 1996 (UNICEF/GoK, 1997) and 48% in 2006 (GoK 2010).

1.1 Statement of the Problem

Machakos county has experienced population explosion over the last 10 years mainly in the urban and peri-urban areas especially Mlolongo. Access to quality water is currently estimated at30%. Mlolongo is characterized by insufficient water supply, poor sanitation, poor waste collections, poor storm drainage, narrow unpaved roads, lack of roads for Emergency access and lack of basic services such as adequate education, health and social facilities. As a result of this increasing populations, combined with increasing water consumption and use of wet sanitation systems, create widespread wastewater disposal problems (Kaloki,2015). Mlolongo Sub County is a peri urban area that has undergone rapid urbanization and population growth, which demands equivalent provision of urban infrastructure especially sanitation services (GoK, 2010). The area is experiencing rapid urbanization as a result of its close proximity to Nairobi City Centre (GoK, 2006). The demand for low- and medium-income rental housing has increased due to increasing number of commercial activities in the area. Residents

and institutions do not provide sufficient accommodation for their domestic and subordinate staff, and educational institutions fail to provide housing for staff and students (GoK, 2006). In Mlolongo relatively large plots of land are being purchased, subdivided and developed without the considering the physical development plan, hence leading to heavy pressures on urban infrastructure particularly sanitation services.

1.2 Objectives of the Study

The main objective of this study was to examine the types of sanitation systems in use in Mlolongo area

1.3 Justification of the Study

Sanitation as a basic condition for development as it aims at improving the quality of life of the individuals; contributes to social development, and reduction of diseases. The growth of population requires more sanitation provisions. In the last 10 years, Mlolongo which function as a residential area to the urban population has resulted in an increase in population (GoK, 2007). The increase in population as observed by Sadalla *et al*. (2001) causes environmental sanitation problems due to inadequate provision of facilities. There is growing number of media articles and documentaries giving attention to sanitation issues that have affected residents in Mlolongo. Among the issues highlighted is the influx of sludge exhauster trucks indicating lack of sanitation infrastructure and demand (Odongo, 2014). This study therefore sought to examine and evaluate the existing sanitation provisions to the community health in Mlolongo Sub County.

2.0 Materials and Methods

2.1 Research Design

A research design is the pattern that the research intends to follow, the plan or strategy for conducting the research (KNBS, 2013). The study adopted a descriptive research design as it applied quantitative and qualitative approaches to better understand the effects of sanitation on community health. Descriptive

research involved observing and describing the behavior of a subject without influencing it in any way. The method aims at finding out "what is" using observational and survey methods to collect descriptive data (Imwati, 2015).

Likewise, case study approach was also employed in the study. Case studies are a common approach in social science and are the preferred strategy for answering how and why variable especially when the subject being studied is a contemporary phenomenon within a real-life context (Khanal *et al*, 2011). Case studies were used in this research due to the field of sanitation being empirical in nature and based on experience from real-life examples (IM, 2015). The approach used in this study is an experiential inquiry that investigates in depth the adoption of sanitation standards within its real-life context.

2.1 Study Area

The study area of my research was carried out in Mlolongo area, Machakos County, Kenya which lies on Latitude 36^0 56′ 40′′, 37^0 55′ 0″ and Longitude 1^0 48′ 20″, 0^0 25′ 0″. This area is situated 20 kilometers south east of Nairobi city along the Nairobi-Mombasa Highway. This study area was selected because it represents the rapid urbanization that is being experienced in Kenya exposing urban dwellers to poor sanitation. World Bank (2010) reported Kenya's urban population grew by 4% in 2010. Same report estimates urban poverty will represent almost half of Kenya's total poverty by 2020.

Map of the Study Area

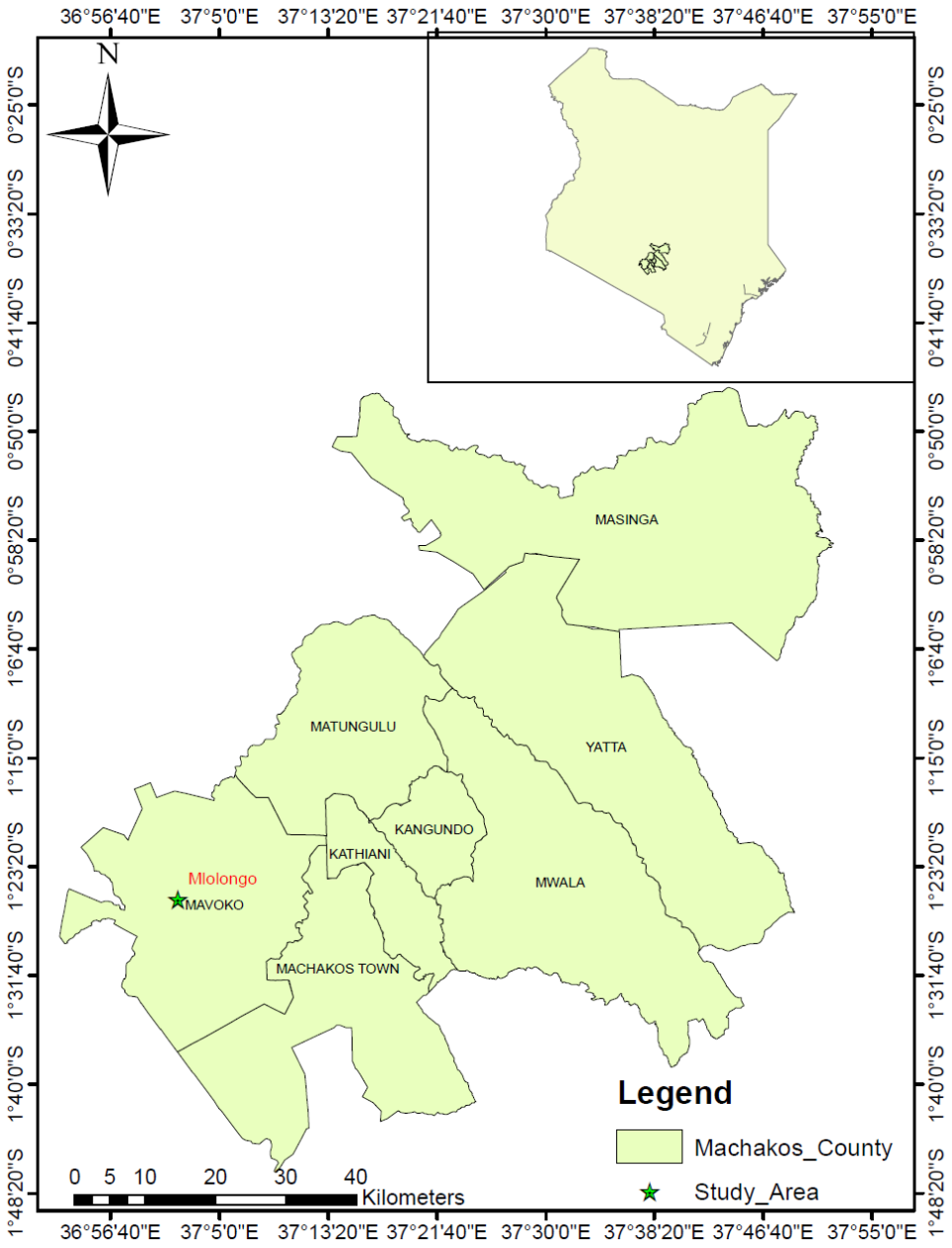


Figure 2.1: Map of Study Area

2.2 Study Population

The sample population consisted of 200 residents of Mlolongo area. Key informants such as officials in the Machakos County in particular Department of Health and Sanitation, Water and Sewage department, public health inspectorate and NEMA Office were interviewed. The study also targeted other key government officers in the Ministries of Lands, Health, Environment Water and Natural Resources, KNBS, Water and Sanitation Service providers such as Water Company, private exhausters. The educational facilities and church organizations situated in the area of study were interviewed on condition of sanitation and health of the community. CBOs dealing with sanitation within the area were interviewed using interview schedules.

2.3 Sampling Technique

Cluster sampling (area probability sampling) technique was used to carry out the study. This technique provides a strategy through which a population can sampled when a comprehensive population list does not exist and it is not possible to construct one (Mugenda, 2008). Neither the total population nor number of households in Mlolongo is known. New housing units (concrete/"mabati") are continuously being constructed as evidence for people moving into Mlolongo throughout the year; this means there is no known sampling frame thus cluster sampling became a convenient sampling technique in this scenario.

2.4 Methods of Data Collection

Data is anything given or admitted as a fact on which a research inference will be based (Kaloki, 2015). Data collection refers to the gathering of information to prove or disapprove some facts. The study used both primary and secondary sources in data collection. Primary data was collected through the questionnaires, interview schedules and direct observation. While secondary data was collected through document and content analysis guide to ascertain an in-depth analysis on the effects of sanitation on community health in Mlolongo area.

2.4.1 Direct observation

Direct observation can be overt, when the subject and individuals in the environment know the purpose of the observation, or covert, when the subject and individuals in the environment are unaware of the purpose of the observation. Covert direct observation was used when observing private exhausters disposing waste into unlicensed sites and storey buildings owners pumping septic/conservancy tanks wastewater into open trenches and into River.

2.4.2 Questionnaire Survey

This method was used to collect demographic data of the study area, for quantifying the sanitation facilities and assessing patterns of use of sanitation facilities by residents and measuring compliance of sanitation provisions to community health. The survey assessed sanitation practices in relation to particular, attitudes, beliefs and values. The questionnaire assessed the residents' views on impacts of sanitation on the community health (Demographic, 2015). Questionnaire surveys utilized structured direct observations on sanitation. These were in form of observation checklists which provided standardized information on the state of sanitary in form of quantitative data (WHO, UNICEF, 2013).

2.4.3 Still Photography

Pictures of interesting scenes were taken to provide content for data collection using other methods and also provided information that could be best captured.

2.5 Data Presentation and Analysis

Both quantitative and qualitative approaches were used for data analysis. Quantitative data from the questionnaire was coded and entered into the computer for computation of descriptive statistics. The statistical Package for Social Sciences (SPSS VERSION 11.5) was used to run descriptive statistics such as frequency and percentages so as to present quantitative data in form of tables and graphs based on the major research questions.

2.6 Ethical Considerations in Research Involving Human Participants

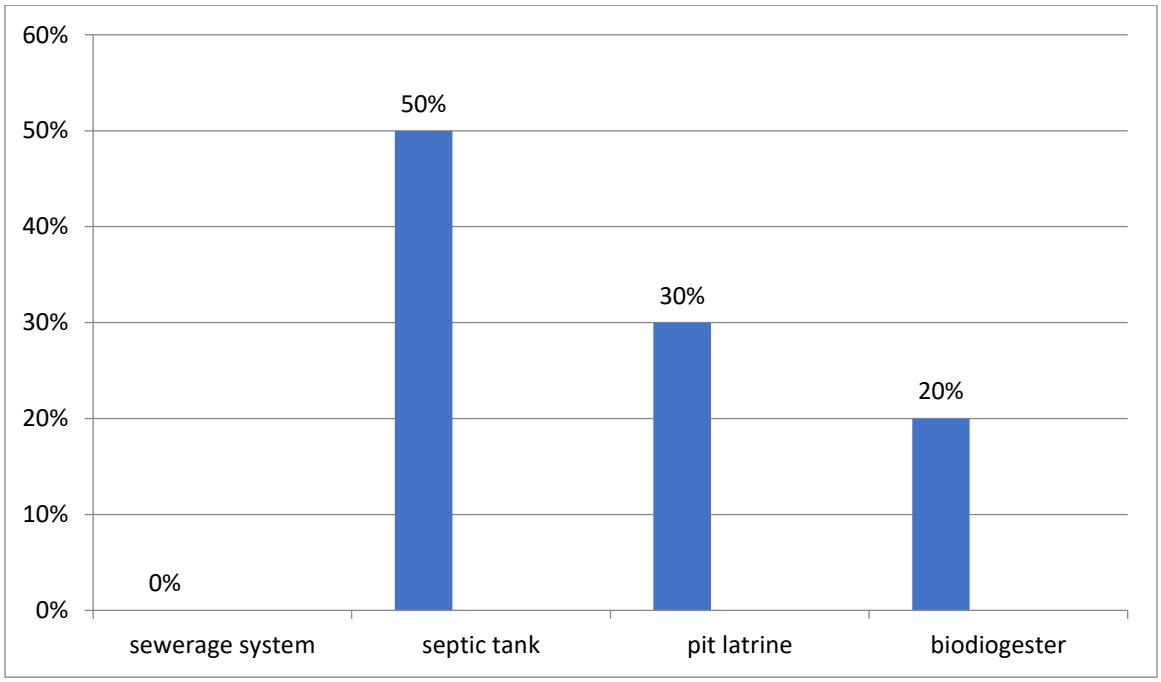
The researcher explained to the respondents about the research and that the study was for academic purposes only. It was made clear that the participation was voluntary and that the respondents were free to decline or withdraw any time during the research period. Respondents were not coerced into participating in the study. The participants had informed consent to make the choice to participate or not. They were guaranteed that their privacy was protected by strict standard of anonymity.

3. 0 Results

3.1 Types of Sanitation Systems in Mlolongo

Sanitation is valued in terms of proper ways of waste disposal. Analysis of the results showed that, 50% of the respondents sampled indicated they use septic tanks as their sanitation facility, 30% use pit latrines, 20% use bio digester. A summary of the sanitation facilities in use in Mlolongo is as shown in table 1 below;

Table 1: Sanitation Facilities Used in Mlolongo



From the findings, out 45.3% pit latrines, 31.0% used pit latrines with slabs, 3.7% used pit latrines without slabs, and 3.6% used ventilated improved pit latrines. This shows that pit latrines with slabs are predominantly used in Mlolongo areas. The most common facility found in Mlolongo is the communal pit latrine. The main reason for the popularity of the pit latrine is that these do not rely on any infrastructure, like water, sewer or power connections.

According to zonal classification, results showed that in Phase one 40% of the respondents utilized the use of pit latrines with slab. In Phase two, 50% of the respondents utilize septic tanks followed by (22%) pit latrines with slab. Likewise, in Phase three of the residents utilize pit latrine with slab while 24% utilize the use of septic tanks.

3.2 Sanitation Disposal System

On investigating the common methods of sanitation disposal, analysis of the results showed that the common method of sanitation disposal as indicated by the respondents was septic tank with 60%, pit latrines 20%, 15% open drainage and 5% bio digester. A summary of the findings is as shown in Figure 1 below:

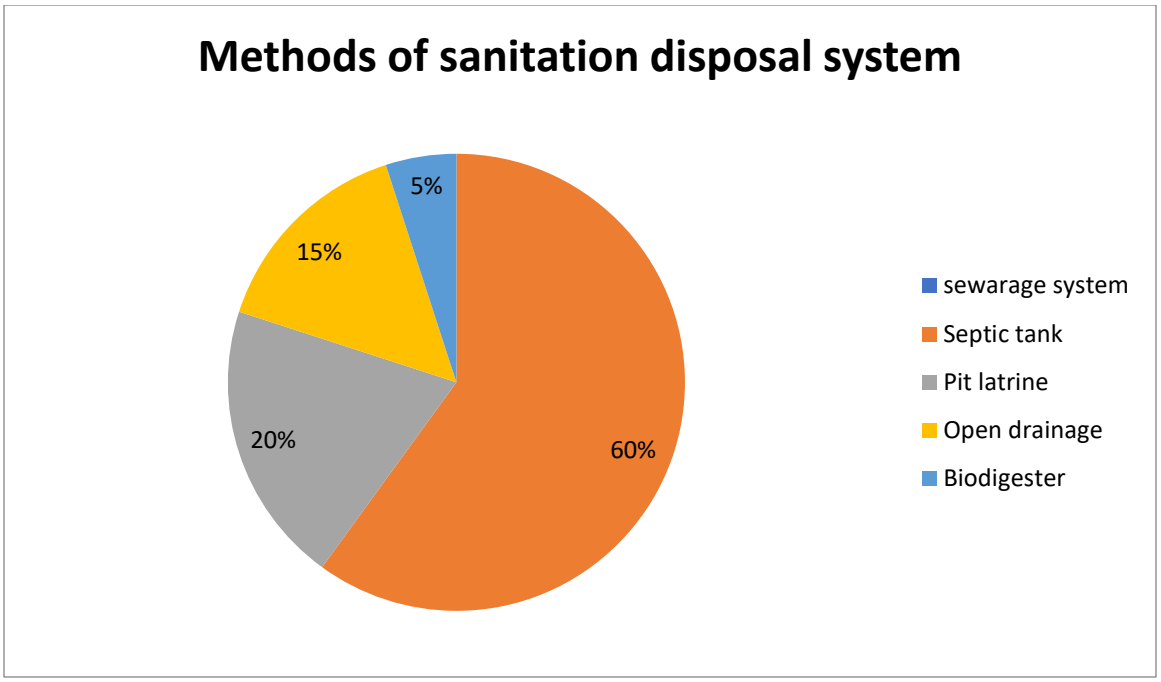


Figure 1: Method of sanitation disposal system

Factors that influenced the choice of the above method of sanitation disposal were mostly driven by lack of sewer within the study area as indicated by 26% of the respondents. Other factors were convenience 18%, the only provider 10% affordability 8% and no influence at 10%. Phase one 25% indicated there was no influence, Phase three 24% indicated convenience, which was also the feeling shared by respondents in Phase two was driven more by lack of sewer system in place at 44% and with an equal split between convenience and lack of influence at 16% respectively. Kasina also displayed the same characteristic as Phase three with lack of system in place mentioned by 29%.

Where septic tank was indicated to be in place, 97% of the respondents indicated that the owner of the property took care of emptying the septic tanks, while only 3% indicated they as tenants were responsible for emptying. The respondents were asked what method of sanitation disposal system they use. The options presented ranged from Sewerage, septic with and without soak-away, pit latrines, open drainage and lagoons.

3.3 Waste Water Discharge

Raw sewage from septic /conservancy tanks from storey buildings in Mlolongo are discharged into open pits. The figure below shows illegal waste water dumping into open pits in Phase three.

Illegal dumping of wastewater into open pits (Source: Field survey)

The situation in Kasina follows the same pattern. The settlement does not have sewerage, drainage, or household waste collection services. People dispose of household waste anyhow polluting the settlement environment. There are a few private toilets, which are often shallow (only 5–6 feet deep) since impermeable bedrock is near the surface in this settlement, as a result they fill up quickly. Such scenarios of discharge of wastewater via open channels are also observed in Church roads and street lanes with other open channels discharge in Phase three area draining into River Athi.

Open discharge of raw sewage in drainage channel along a road (Source: Field survey)

4.0 Conclusion

The essential treatment and dispersal of effluent in Mlolongo areas is not centralised, leading poor sanitation systems. The poor septic tank soil absorption systems are the leading cause of contamination of the water sources in these areas. The failure of onsite sewage treatment systems could lead to serious environmental and public health impacts. The two issues are interrelated and most environmental impacts if they become sufficiently severe ultimately result in health implications including: Spread of infectious diseases, breeding of mosquitoes and attraction of flies and rodents, Nuisance, unpleasantness and odour, Pollution and infection of surface water bodies, Contamination of boreholes, wells and groundwater; and Alteration of local ecology.

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Conflict of Interest

The author declares that there is no conflict of interest.

Ethical Approval

Ethical approval was sought from the School of Disaster Management at the Institution.

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